

AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A die apparatus for performing a flashless forging operation to manufacture the toothed portion of a steering rack, said die apparatus comprising:
first and second die members and at least one punch member, each having a forming surface shaped substantially as the obverse of a portion of said toothed portion, and
at least a portion of the forming surface of said first die member being shaped substantially as the obverse of the teeth of said rack,
wherein said first and second die members are moveable towards each other to a closed position thereby partially forging said toothed portion from a blank placed in said die apparatus and forming a substantially closed cavity defined by said forming surfaces,
said punch member being adapted to move into said cavity, once said die members are in said closed position, thereby completing said forging operation.

2. (Original) A die apparatus as claimed in claim 1 wherein said punch member is moveable into said closed cavity through an aperture in one of said die members.

3. (Original) A die apparatus as claimed in claim 2 wherein said aperture is in said second die member and said punch member is moveable with respect to said second die member.

4. (Original) A die apparatus as claimed in claim 3 wherein said punch member is disposed substantially centrally and opposite said first die member, and is moveable towards said first die member.

5. (Original) A die apparatus as claimed in claim 1 wherein said die members abut against each other at said closed position.

6. (Original) A die apparatus as claimed in claim 1 wherein said at least one punch member comprises first and second punch members disposed on opposite sides of said cavity, between said first and second die members.

7. (Original) A die apparatus as claimed in claim 1 wherein said punch member is moveable by means of a mechanism operated by the motion of said die apparatus closing.

8. (Original) A die apparatus as claimed in claim 7 wherein said mechanism comprises at least one wedge member adapted to urge said punch member into said cavity.

9. (Original) A die apparatus as claimed in claim 1 wherein at least one of said die members is supported by a hydraulic cylinder pressurised by means of said die apparatus closing.

10. (Original) A die apparatus as claimed in claim 1 wherein the cross section of said toothed portion is substantially D-shaped.
11. (Original) A die apparatus as claimed in claim 1 wherein said blank is a solid bar.
12. (Original) A die apparatus as claimed in claim 1 wherein said blank is cylindrical.
13. (Original) A die apparatus as claimed in claim 1 wherein said blank is a hollow bar and said die apparatus further comprises a mandrel adapted to be inserted into said hollow bar prior to said forging operation.
14. (Original) A die apparatus as claimed in claim 1 wherein said die apparatus further comprises at least one axially moveable end punch.
15. (Original) A die apparatus as claimed in claim 14 wherein said end punch is adapted to upset an end of said blank.
16. (Previously Presented) A method of manufacturing a steering rack comprising performing a forging operation on a blank by means of a die apparatus as claimed in claim 1.

17. (Original) A method of manufacturing a steering rack as claimed in claim 16 wherein the teeth of said steering rack are forged to net shape by said forging operation.

18. (Original) A method of manufacturing a steering rack as claimed in claim 16 wherein the cross section of the toothed portion of said steering rack is substantially D-shaped.

19. (Original) A method of manufacturing a steering rack as claimed in claim 16 wherein said blank has a first cylindrical portion and a second cylindrical portion smaller in diameter than said first cylindrical portion, said second cylindrical portion being forged to form the toothed portion of said steering rack, the shaft of said steering rack comprising said first cylindrical portion.

20. (Original) A method of manufacturing a steering rack as claimed in claim 19 wherein said blank further comprises a third cylindrical portion, substantially equal in diameter to said first cylindrical portion, said second cylindrical portion being between said first and third cylindrical portions.

21. (Original) A method of manufacturing a steering rack as claimed in claim 16 wherein said blank is heated to a warm forging temperature prior to said forging operation.

22-25. (Cancelled)

26. (Previously Presented) A steering rack made by the method of claim 16 wherein the toothed portion of said steering rack has two opposed longitudinal indentations on either side thereof, said indentations being formed by said forging operation.

27. (Previously Presented) A steering rack comprising a toothed portion wherein said toothed portion has two opposed longitudinal indentations on either side thereof.

28. (Previously Presented) A steering rack as claimed in claim 27 wherein the cross section of said toothed portion is substantially D-shaped.

29. (Previously Presented) A steering rack as claimed in claim 27 wherein said toothed portion is manufactured by a forging process.

30. (Previously Presented) A steering rack as claimed in claim 29 wherein said indentations are formed during said forging process.

31. (Previously Presented) A steering rack as claimed in claim 29 wherein the teeth of said toothed portion are forged to net shape.

32. (New) A die apparatus as claimed in claim 6 wherein said punch member is moveable by means of a mechanism operated by the motion of said die apparatus closing, said mechanism comprising first and second wedge members adapted to urge said first and second punch members, respectively, into said cavity, and at least one of said die members is supported by a hydraulic cylinder pressurised by means of said die apparatus closing.